THE AMERICAN REVIEW OF TUBERCULOSIS

OFFICIAL JOURNAL OF THE AMERICAN TRUDEAU SOCIETY

ABSTRACTS

EDITOR

MAX PINNER, New York, N. Y.

EDITORIAL BOARD

JOHN ALEXANDER, Ann Arbor, Mich.
J. BURNS AMBERSON, JR., New York, N. Y.
E. R. BALDWIN, Saranac Lake, N. Y.
H. J. CORPER, Denver, Col.
F. S. DOLLEY, Los Angeles, Calif.
BRUCE H. DOUGLAS, Detroit, Mich.
L. U. GARDNER, Saranac Lake, N. Y.
ROSS GOLDEN, New York, N. Y.
ESMOND R. LONG, Philadelphia, Pa.
LEWIS J. MOORMAN, Oklahoma City, Okla.
D. W. RICHARDS, JR., New York, N. Y.

VOLUME LIII

JANUARY-JUNE, 1946

PUBLISHED MONTHLY

AT MOUNT ROYAL AND GUILFORD AVENUES, BALTIMORE 2, MD.
BY THE NATIONAL TUBERCULOSIS ASSOCIATION

THE

AMERICAN REVIEW OF TUBERCULOSIS ABSTRACTS

VOLUME LIII JANUARY, 1946 ABST. NO. 1

Air-borne Tuberculosis.—If normal guinea pigs are placed in individual cages in an ordinary animal room housing tuberculous animals, the exposed pigs acquire tuberculosis of respiratory origin. Those at a distance acquire tuberculosis just as often as those in the immediate proximity. Several experiments were conducted with inbred rabbits of varying resistance to tuberculosis. In the first, they were put in individual cages separated by a wire mesh screen from a runway for infected rabbits which shed tubercle bacilli in their urine. The disease acquired is of respiratory origin beginning as a single primary focus. The disease acquired by these families closely corresponds to the different types of tuberculosis seen in man. The second experiment was carried out by using the same type of housing, but having one room and its quarters irradiated and the other not irradiated by ultraviolet rays. Litter mates of both high and low resistance were placed in corresponding positions in the contact cages of both rooms, and the rabbits serving as the source of infection were interchanged daily between the two rooms. At the end of one year, 11 of 15 contacts in the nonirradiated room died of tuberculosis. None of the 15 litter mates in the irradiated room acquired tuberculosis. Three animals in the control room developed tuberculin sensitivity, but no tuberculous changes were found at autopsy. It is therefore probable that ultraviolet radiation may control air-borne contagion of human tuberculosis. It was noted that resistance to attack by air-borne contagion is distinct from resistance to progression of the ensuing disease. In similar experiments, but with an increase in the number of bacilli in the environments, there was shown in rabbits of high resistance to disease an increased incidence of infection, acceleration in rapidity of the attack and an affect on the essential character of the disease in proportion to the concentration of the infectious agent. In rabbits of low genetic resistance to tuberculosis, increasing the concentration of tubercle bacilli also increases the incidence of the disease and accelerates its onset. The character of the disease is not affected, it remaining a rapidly progressive and disseminating type. Beyond a certain concentration, further increases in the infecting agent produced no effect.—*Experimental Air-Borne Tuberculosis, M. B. Lurie, Am. J. M. Sc., February, 1945, 209: 156.*—(*G. F. Mitchell*)

Pulmonary Lesions Due to Waxy Fraction of Tubercle Bacillus.—The endotracheal injection of the waxy fraction of tubercle bacilli in guinea pigs caused the formation of granulation tissue, fibrosis and occasional giant cells.—*Ricerche istologiche sulle lesioni polmonari prodotte dalle cere del B. K. iniettate per via endotracheale, S. Savarino, Ann. Ist. Carlo Forlanini, 1942, 6: 730.*—(*G. Simmons*)

Specific Proteolytic Enzymes in Pleural Effusions.—In 73 out of 75 cases of pleurisy with effusion and in 20 out of 26 cases of subsiding pleurisy with effusion, the urine contained specific proteolytic defense enzymes. Three different products of the tubercle bacillus were used for the demonstration of such ferments: (*1*) caseous substance, giving 66 per cent; (*2*) endoproteins, giving 70 per cent; and (*3*) esoproteins obtained from cultures,

giving 61 per cent of positive results. These findings confirm the opinion of most workers in this field that pleurisies with effusion are always of tuberculous origin.—*Sulla natura tubercolare delle pleuriti clinicamente primitive: La ricerca delle proteasi specifiche di difesa nei pleuritici, C. Cattaneo & B. Mariani, Ann. Ist. Carlo Forlanini, 1942, 6: 145.*—(*G. Simmons*)

Allergy after BCG Vaccination.—After BCG vaccination the sensitivity against tuberculin is increased. There is a marked tendency to relate this postvaccinal allergy to certain general characteristics of the morphological and local types in order to explain the individual variations. The general constitution as well as certain skin diseases play a definite rôle in increasing the sensitivity against tuberculin. The authors have found a marked contrast in postvaccination allergy in the young adult and in the newborn. It is more rapid and intense in the young adult and is retarded in the newborn. Four hundred and eighty-nine young male adults (23.6 per cent of the total examined) between 18 and 23 years who were anergic to tuberculin in concentrations from 1:10,000 to 1:10 (Mantoux technique) have been studied. They were vaccinated by intracutaneous injection of 0.15 mg. of BCG in physiological salt solution. Within four to twenty-eight days these persons were subjected in groups to the Mantoux test. From the fourth to the fifteenth day a dilution of 1:10 of Old Tuberculin, and from the twentieth to the twenty-eighth day of 1:100 was employed. The group tested on the fourth day showed entirely negative skin tests. The group tested on the ninth day showed 9.7 per cent positive results. The positive results were more frequent in groups tested after the ninth day and finally reached 85.7 per cent on the twenty-eighth day. It is assumed that these young adults had not been infected with tuberculosis prior to their vaccination. The proof is found in the fact that on the fourth day after the application of BCG none of the tested persons showed any reaction to tuberculin and that the allergization started only after the ninth day. Secondary proof is that no case of positive Koch phenomenon with early suppuration was observed, although this is quite frequent in cases of vaccination of persons with primary infections. The authors also studied the local conditions of the skin and the possibility that these could influence the establishment and intensity of allergy. According to the color of the skin, four groups (white, swarthy, brown and black) and according to the hairiness, three groups (hairless, hairy and hirsute) were tested separately. The results showed that in these seven groups there was no difference in the intensity or chronology of the allergy produced after vaccination with BCG. A series of 218 newborn received before the seventh day of life 0.15 mg. of BCG by intracutaneous injection. The appearance of a positive Mantoux test was also investigated. The babies were divided in groups. These were tested by intracutaneous injections of 1:10 tuberculin from the fifteenth day to the fourth month after vaccination. None of the children showed an allergic reaction on the fifteenth day. After one month only 12.3 per cent showed a positive skin test; after two months, 60 per cent; after three months, 65 per cent; and after four months, 80 per cent. Despite the fact that tuberculin 1:10 was used, only moderately intense reactions were obtained. There is a marked contrast in the duration of the preallergic postvaccinal period between young adult and newborn. After one month 85.7 per cent of the young adults were sensitive to the Mantoux test with 1:100 Old Tuberculin, whereas, four months were necessary to obtain the same result with a dilution of 1:10 in the newborn. The authors believe that this is due to the fact that water is more readily absorbed in the skin of the newborn than it is in the adult. In order to produce a local irritation, it is necessary for the tuberculin to remain a certain time within the skin. If the absorption time for fluid is accelerated, the tuberculin passes rapidly into the blood-stream. For that reason, the local reaction in the newborn

is less severe. The authors come to the conclusion that nothing shows that the immunity conferred by BCG is established after a prolonged period of time. Although the local allergy against tuberculin is retarded in babies they believe in effect that the Mantoux test does not give any indication as to the beginning nor to the intensity of the immunity. As practical consequence, there is no reason to isolate the vaccinated infants until the allergy appears.—*Influencia de la edad, color y grado del pilosidad sobre el comienzo de la sensibilidad tuberculinica. Post-vacunacion con B.C.G., R. A. Vaccarezza & C. A. Urquijo, Rev. argent. de tuberc., July–September, 1944, 10: 185.*—(*W. Swienty*)

Pathological Changes following BCG Vaccination.—The study is based on autopsies of 57 children up to the age of 2 who had received BCG vaccine and had died of nontuberculous diseases (bronchopneumonia, meningitis, dyspepsia, etc.). Twenty-five nonvaccinated cases were taken as controls. The entire group of vaccinated children showed characteristic changes in the reticuloendothelial system. The changes differed with the age of the child, being dependent on the time elapsed since vaccination. The lymph nodes showed a very pronounced catarrhal sinusitis. There was marked hyperemia. The lymph sinuses were dilated and filled with large endothelial cells and lymphoblasts. There was complete absence of monocytes and histocytes. The lungs showed accumulations of lymphoid and histocytic elements in the interstitial tissue of the cortical regions. The liver showed cellular infiltrates, mostly perivascular, consisting mainly of lymphocytes and occasional endothelial cells. In the spleen there was hyperplasia of the follicles and proliferation of endothelial cells in the sinuses. At the age of 6 months a quieting-down of all these processes was noted. The sinuses of spleen and lymph nodes became narrower, there was a regression of cellular infiltrations and a steady increase in histocytic elements at the site of the lesions. At the age of one year the lymph nodes showed progressive fibrosis. Spleen and liver revealed at this time analogous trends of cell metamorphosis. At the age of 2 all above processes were stabilized to a great extent. The lymphoid system showed the development of a fine fibrous tissue, especially in the marginal sinuses. The investigations show that reactions to the strain of BCG appear as early as a few weeks after vaccination, increase in intensity up to the age of 3 to 4 months, after which time retrogressive changes are observed, finally resulting in fibrosis after the age of one year. In addition to the above described reactions of "paraspecific" nature, 14 of the 57 children showed caseous lesions in the lymph nodes, combined in 3 cases with typical tubercle formation in the parenchymatous organs. Caseous lymphadenitis affected as a rule not less than 3 groups of lymph nodes. The order of frequency and intensity of involvement was: the cervical group, the submandibular group and the retropharyngeal group. The lymph nodes at the bifurcation and the tracheobronchial lymph nodes seemed to be involved to a minor extent, the lesions being less of the caseous and more of the paraspecific catarrhal type. Because of these findings it is supposed that the first changes after oral administration of BCG occur via the lymphatics of mouth and pharynx. This assumption is corroborated by the fact that in 3 cases specific tubercles were found in the tonsils. The paraspecific processes, occurring in all children, and the caseous lesions are considered as essentially related, differing only in the degree of reactivity of the reticulo-endothelial system towards BCG. The control group of unvaccinated children did not reveal any similar pathological findings. The 57 cases had received the BCG strain "Paris." Clinical observation had showed that administration of this strain had been followed by a higher incidence of clinical complications than the administration of the strain BCG I. A second pathological study was based on 20 autopsies of cases vaccinated with the BCG I. No fundamental difference in the reactions to the two strains was noted. Both produced an irrita-

tion of the reticulo-endothelial system. However, the reactions to the second strain were much less intense and less frequent. In addition, the delay after which retrogressive changes occurred was shorter, the onset of fibrosis being noticeable already at the age of 6 months. The incidence of specific changes with caseation and giant-cell formation was much lower; only one case out of 20. (Caseous mesenteric lymphadenitis.) This second group of autopsies showed the predominant changes in the lymphatic apparatus of the intestinal tract.—*Pathological Changes in Children Vaccinated with B.C.G., V. I. Pusik, Probl. tuberk., 1944, 5: 25.*—(*V. Leites*)

Vaccination with BCG.—In U.S.S.R. vaccination with BCG is conducted on a mass scale, being administered to the majority of newborn children. In 1940 635,000 children were vaccinated, in 1941 470,000. This investigation regarding the effectiveness of BCG was based on the study of children born in 1938. The first group consisted of 56,951 children who had been vaccinated at birth. The second group consisted of 17,469 children who had not been vaccinated for various reasons, mostly because of lack of vaccine. It was found that the mortality from tuberculosis within the first year of life was almost twice as high in the nonvaccinated group. This group also showed a higher morbidity from tuberculosis within the first year. The decrease in the mortality from childhood tuberculosis in Moskow has been about 40 per cent from 1937 till 1940. This decrease is considered by the author as an indirect proof for the effectiveness of antituberculous vaccination on a mass scale. Comparison of mortality rates from childhood tuberculosis in Moskow and Leningrad showed the greater effectiveness of subcutaneous vaccination which had been practiced in Leningrad. However, the difference was only slight, and it is not felt to warrant mass application of subcutaneous vaccination in the newborn because of the possibility of subcutaneous infiltrates.—*The Effectiveness of Anti-tuberculous Mass Vaccination with BCG, M. A. Klebanow, Probl. tuberk., 1944, 5: 43.*—(*V. Leites*)

BCG Vaccination in America.—Approximately 1,000,000 children were inoculated with BCG vaccine in Brazil between 1927 and 1942. In the same period 58,000 children were vaccinated in Uruguay and about 90,000 in Argentina. Various studies on BCG vaccination were made also in the U.S.A. The great majority of the vaccinated children became tuberculin reactors. Studies on rather small series of individuals, but under particularly favorable experimental conditions (identical conditions of life and of exposure), show markedly reduced morbidity and mortality rates among vaccinated children as compared to those found among not vaccinated controls. The statistical data obtained in the above countries are tabulated and the results tested by the method of Pearson. It appears that the markedly lower morbidity and mortality rates in vaccinated children as compared to suitable controls cannot be due to mere chance; they are rather a confirmation of the value of the Calmette Guérin method of prophylaxis.—*Analisis estadistico de los resultados de la vaccinacion antituberculosa con el B.C.G. en las Americas, A. P. Leon, Rev. mex. de tuberc., April, 1944, 6: 31.*—(*L. Molnar*)

BCG and Resistance to Tuberculosis.—The author has had twenty years of experience in Cuba with BCG vaccine. This experience has clarified some of the more obscure points regarding the action of BCG. Although the hopes of Calmette and his collaborators that the vaccine would result in a complete resistance to the infection did not materialize, it is now established that BCG is very efficient in augmenting resistance. But we do not yet know the exact mechanism of its action. A review of the literature shows that the observers who have had experience of at least 10,000 vaccinations are fervent partisans of BCG, whereas those who have had little experience generally are not.

Poor results have been obtained because of faulty technique or faulty preparation and handling of the vaccine. This was the case in Lübeck. The failures in obtaining a durable resistance are due mostly to using dead bacilli or products derived from dead bacilli. It is important that live germs be used. Dead BCG does not give any resistance, or for a very short period of time only. This has been proved by animal experiments. The author has studied the changes which take place as a result of the different manipulations during the preparation of the vaccine. The optimum for obtaining a good vaccine is a culture of less than twenty-eight days of growth on glycerine-potatoes at a temperature of 98.6°F. Trituration for thirty minutes with glass balls does not alter the vitality of the germs, but should not be maintained for more than fifteen minutes. It is questionable whether the natural primary infection is a process which should be imitated or improved by vaccination with BCG. The natural primary infection generally augments the resistance to reinfections, but can also cause a progressive infection with acute illness and even death. Immunity and allergy are expressions of the balance of different factors which intervene in the organic functions. Their equilibrium is necessary for the normal development of the organism and adaption to the new conditions that are created by any illness. In the phenomenon of Koch immunity reacts with the corresponding allergy. A direct action of the toxic substance exists with the specific antibodies. Subjects who have had glandular manifestations of tuberculosis in infancy have a greater resistance to the severe types of tuberculosis in later years. Two great mechanisms work together in the fight against the bacilli: the localization and destruction caused by the immunity, and the elimination. The action of the BCG has been explained as follows: The vaccine produces substances which act upon the newly arriving bacilli. The allergy is one of the phenomena of the immunization and expresses the degree of resistance. Successfully vaccinated persons should present an allergic reaction. The end of the immunization can be determined by the moment when allergy disappears. The vaccination should provoke early, intense and lasting allergy. The author's experiments with animals prove that we can no more consider allergy as a true expression of an improved resistance to tuberculosis. The BCG permits the discovery of anergy to tuberculin and certain modifications of an actual allergy. This may be called occult or latent allergy. Little is known of the mechanisms that take place in the prevention and curing of tuberculosis. In the beginning of the infection antibodies appear in the blood, and a more or less apparent allergy becomes evident. This is not an indication of healing or failure of healing. BCG vaccination is one form to normalize the primary infection by a nondangerous mechanism. The establishment of allergy in a vaccinated subject without clinical evidence of tuberculosis can be interpreted as due to the vaccination. The author has experimented with an extract of BCG which is more active and less susceptible. Animal experiments with it have proved that the reaction to this extract is much more intense and lasting than with any other tuberculin. Systematic intracutaneous revaccination must be made independently of the allergization of the subject. This is necessary in order to maintain the immune reaction on a high level and to obtain a specific prophylaxis to tuberculosis. The author's BCG extract gives a high percentage of positive reactions in subjects who have not shown allergy after vaccination with PPD and OT.—*Sobre el aumento de la resistencia antituberculosa conferido por el B. C. G., P. Domingo, Rev. cubana de tuberc., July–September, 1944, 8: 411.*—(*W. Swienty*)

Pneumothorax.—The indications for induction of pneumothorax have become so elastic that the number of absolute contraindications (congestive heart failure, rapidly progressive bilateral disease, poor general condition, etc.) is small. Once pneumothorax is induced proper spacing of refills, observa-

tion of the status of the contralateral lung, frequent fluoroscopy and roentgenoscopy are some of the physician's responsibilities. Large pleural effusion, rupture of the lung, adherent pleuritis may, but not necessarily will, render the continuation of pneumothorax treatment impossible. Inadequate collapse is dangerous to the patient and to the community, and constitutes an indication for discontinuation of pneumothorax.—*Artificial Pneumothorax Treatment and Its Responsibilities, P. L. Deshmukh, Med. Bull., Talegaon Tuberculosis Sanatorium, Poona, India, November, 1943, 11: 1.*—(*P. Lowy*)

Pneumothorax.—The contraindications to artificial pneumothorax treatment are the following: (*1*) myocardial inefficiency, (*2*) dyspnea, (*3*) cyanosis, (*4*) extensive infiltration of both lungs, (*5*) emphysema, (*6*) hypertension, (*7*) advanced tuberculosis of other organs, except the larynx, (*8*) miliary tuberculosis, (*9*) advanced nephritis and (*10*) tuberculous pneumonia. Adhesions, obliterative pleuritis, purulent effusion, severe reactions after refills, perforation of the lung may necessitate discontinuation of pneumothorax treatment. Even if technically satisfactory collapse is obtained, the lesions may not heal and spread of the disease may occur. One hundred and eleven cases treated by the author were divided into three classes: (*1*) cases with unilateral disease, (*2*) bilateral tuberculosis with only one lobe affected in one of the lungs, (*3*) extensive involvement of both lungs. In only 10 (32 per cent) cases of the first group could effective pneumothorax be maintained. Fifteen (62.5 per cent) patients of the second class received pneumothorax treatment, and in only one of them was the treatment successful. In the third group no effective pneumothorax could be given.—*Limitations of Artificial Pneumothorax Treatment, P. L. Deshmukh, Medical Bulletin, Talegaon Tuberculosis Sanatorium, Poona, India, November, 1942, 10: 1.*—(*P. Lowy*)

Empyema and Pneumonolysis.—During a five-year period between 1938 and 1943, 754 sections of pleural adhesions were performed in the tuberculosis services of the city of Buenos Aires. Empyema occurred in 24 cases, of which 9 were related directly to the operation. In 5 of the 9 cases pulmonary perforation was the evident cause of the empyema. Four causes of perforation are listed: partial section of adhesions, cortical pulmonary lesions, bronchopulmonary hypertension from ball-valve mechanisms and the rupture of a zone of least resistance in the cauterized area.—*Consideraciones sobre empiema y operación de Jacobaeus, F. A. Médici & R. Sampietro, An. Cáted. de pat. y clin. tuberc., December, 1943, 5: 324.*—(*R. Kegel*)

Mediastinal Shift.—An inspiratory shift of the mediastinum toward the side of a pneumothorax may be observed sometimes. This shift is due to a disturbance of the equilibrium between intrapulmonary and intrapleural pressures. These pressures have been studied simultaneously in a guinea pig and it appears that during inspiration the intrapulmonary pressure descends to about −1.5 cm. of water and rises to +2 cm. of water during expiration. The intrapleural pressure changes from −7 cm. during inspiration to −1 cm. during expiration. Comparison of these two pressures reveals that the decrease of the intrapleural pressure is more pronounced than that of the intrapulmonary pressure. In other words, the difference between intrapulmonary and intrapleural pressure increases during inspiration and reaches a maximum shortly after the inspiration is completed. Thus, in the animal studied, the intrapulmonary pressure was 2.5 cm. of water higher than the intrapleural pressure during expiration, whereas the difference became 5 cm. of water shortly after inspiration. The mediastinal shift is due to the increased intrapulmonary pressure of the healthy lung during inspiration. When the pressure equilibrium is restored, the mediastinum returns to its normal position due to its own elastic retraction and to that of the healthy lung and not to an increase in the intrapleural pressure on the pneumothorax side. A mediastinal shift

occurs only under two conditions: (*1*) When the collapsed lung has lost all of its expansile capacity because the disease has progressed too far. (If only one healthy lobe remains, the inspiratory expansion of this healthy lobe is sufficient to overcome the disproportionately increased negative intrapleural pressure and no mediastinal shift occurs.) (*2*) When the mediastinum has become too flaccid due to too great refills and is pushed over toward the healthy side. In this case the mediastinum returns toward its normal position during inspiration and is again pulled toward the healthy side during expiration. A mediastinal shift indicates faulty technique in the management of a pneumothorax and often is due to too copious refills. Sometimes, however, it is difficult to prevent an inspiratory shift of the mediastinum in the case of a left pneumothorax because the heart, freed from the attraction toward the chest wall, tends to assume a median position due to its own weight. It results that, whereas in a right pneumothorax it is safe to arrive at a maximal intrapleural expiratory pressure of 0 or +1, it is safer never to surpass expiratory intrapleural pressure of −2 or −1 on the left, because "one must always jealously watch that in the course of a pneumothorax the mediastinum may not become deviated."—*Le balancement du médiastin au cours du pneumothorax artificiel, M. Baillet, Presse méd., May, 1940, No. 46, 525.—(G. Simmons)*

Spontaneous Pneumothorax in Infant.—An 18-day-old girl developed spontaneous pneumothorax followed shortly thereafter by staphylococcus empyema. Aspiration of air and fluid improved her condition, but it was necessary to perform rib resection and tube drainage to effect a cure. The infant was also treated with sulfathiazole, lavage of the pleural cavity and with transfusions. It is believed that the patient had developed a staphylococcus infection in her lung, and a subpleural focus ruptured into the pleural cavity. This assumption is strengthened by the fact that lavage fluid was coughed up on one occasion.—*Spontaneous Pneumothorax and Staphylococcal Empyema, Elizabeth Lund, Lancet, May 26, 1945, 248: 661.—(H. Marcus)*

Circulation Time in Bilateral Pneumothorax.—Mention is made of the various attempts to measure circulation time in collapsed lungs and the conflicting results obtained. The authors present their findings in 15 cases of bilateral pneumothorax. The arm-lung tract method of Hitzig (ether) in which four to eight seconds is considered normal, and the arm-tongue tract method of Winternitz, Deutsch and Bruell (decholin) in which nine to sixteen seconds is considered normal, were used. Circulation time was found to be normal in 12 of the 15 by the arm-lung tract method and in all by the second method. The authors found no relationship between circulation time and vital capacity. Consideration is given to the hyperemia and ischemia theories of the collapsed lung and the concept presented that both are compatible with pulmonary physiology. This, they claim, is possible because of the two types of blood vessels in the lungs, described by Tiemann and Daiber: one, the large repository vessels which may be full or empty (thus producing a state of hyperemia or ischemia), and the second, which surround the first and has a normal circulation.—*El tiempo circulatorio en individuos sometidos a neumotorax bilateral, N. Gonzalez de V. & J. Navajas T., Rev. españ. de tuberc., February, 1945, 14: 111.—(J. S. Peterson)*

Bronchospirometry in Pnemuothorax.—Spirometric tests were made on 13 cases of pulmonary tuberculosis, treated with unilateral pneumothorax. In the collapsed lung, a constant decrease of the vital capacity was noticed; a less marked decrease of the respiratory volume was also observed. The decrease of the vital capacity, in almost all cases, was chiefly due to the decrease of reserve air, and secondly to the decrease of the complementary air. The average decrease of the various percentages is 15.2 in the case of the vital capacity, 12.4 for the complementary air,

19.8 for the reserve air and 12.1 for the respiratory volume. The oxygen intake also decreased in the collapsed lung, especially in the cases complicated with atelectasis. The ventilation equivalent improves with the induction of pneumothorax. As regards the uncollapsed lung, a compensatory increase of the oxygen intake as well as the respiratory volume was recorded.—*Estudio broncoespirométricos en la colapsoterapia, R. F. Vaccarezza & A. Soubrié, An. Cáted. de pat. y clin. tuberc., June, 1944, 5: 5.*—(*H. Behm*)

Sodium Citrate as Preventive of Pleural Adhesions.—In order to prevent the premature loss of a pneumothorax space after the appearance of a pleural effusion 3.8 per cent sodium citrate was successfully used. In 44 cases of 5 to 6 years old pneumothoraces with small effusions, 5 cc. of 3.8 per cent sodium citrate solution was injected into the pleural space twice weekly for two to three months. Symphysis of the pleurae occurred only in 11 cases. Applying this method, the author succeeded in maintaining a good pneumothorax in 21 out of 25 cases of massive pleural effusion. The following technique is suggested: As soon as the pleural effusion sets in, 5 cc. of the solution are injected. This injection is repeated a week later and is repeated until the formation of fluid stops.—*Le citrate de soude moyen de lutte contre la symphyse pleurale, A. Dussert, Rev. de la tuberc., 1942, 7: 155.*—(*G. Simmons*)

Preoperative Cardiovascular Examination.—Circulatory complications which can interfere in thoracic surgery depend upon the sufficiency of the heart and its resistance to the surgical shock. In La Esperanza Sanatorium in Habana, Cuba, the patients scheduled for thoracic surgery go through a routine procedure of cardiovascular examinations which includes electrocardiogram, vital capacity and velocity of blood. Tachycardia is common in tuberculous patients. A pulse rate of more than 120 per minute over a prolonged period of time is the expression of a toxemic state of the myocardium and constitutes an absolute contraindication for any surgical intervention. A second stage thoracoplasty should be postponed if tachycardia intervenes after the first stage. The tachycardia may not only be the expression of a compensatory mechanism, especially if the hematopoiesis has been affected by extensive lesions or an exaggerated therapeutic collapse. If the arterial pressure is low the patient's general condition should first be built up. Hypotension is due to active vasoparesis and even dilatation of the arterioles as a consequence of the action of the tuberculous toxins on the vasomotor centres. Caution is advocated in case of hypertension. No patient with a blood-pressure of over 150 mm. Hg should be operated upon. The pleuropulmonary tuberculosis as well as all forms of collapse therapy seem to have no effect on the venous pressure. Among the large number of surgical cases at La Esperanza, not one has been observed with elevated venous pressure or collateral venous circulation after surgery. The venous pressure can only be affected by compression of the great veins, by tumor masses of the mediastinum, aortic aneurysm, enlargement of the lymph nodes of the axilla etc. These conditions may cause compression or obstruction of the lumen of the large veins. The value of the vital capacity tests is limited as the normal lung tissue of the patients is reduced by the pulmonary lesions or by the therapeutic collapse. Also, the tests have to be made on patients on absolute bedrest or restricted activity. Changes in the heart great enough to produce changes in the electrocardiogram are not frequently seen in tuberculous patients, the most frequent being sinus tachycardia. This is caused by the action of the toxins on the autonomic centres of the heart and on the neurovegetative system, or by a hyperfunction of the adrenal gland. Other lesions visible in the electrocardiogram are rare. But myocardial lesions of tuberculous or nonspecific origin are frequently found in autopsies, although these lesions had not been seen in the electrocardiogram. Sinus tachycardia, if under 120 and not constant, and isolated extrasystoles are

no contraindications for surgery. Any tachycardia of over 120, frequent extrasystoles, electrocardiographic evidence of myocardial damage, heart block, auricular flutter, coronary occlusion are absolute contraindications. If chest surgery absolutely has to be done under these circumstances, local anesthesia should be used after controlling the toxemia as much as possible.—*Examen cardiovascular preoperatorio de los tuberculosos pulmonares en cirugia pulmonar, R. C. Barrena, Rev. cubana de tuberc., July–September, 1944, 8: 432.*—(*W. Swienty*)

Late Results of Thoracoplasty.—Of 242 cases of pulmonary tuberculosis treated with thoracoplasty, 20 (8.26 per cent) showed recurrence of the disease after "a long period of time" following the operation. In 17 cases the disease appeared on the side operated on. In 7 the recurrence was due to a too limited thoracoplasty and in 10 cases the thoracic wall was too rigid to permit a satisfactory collapse. In 3 cases there was recurrence of the disease on the contralateral side. Only 2 patients died. They had been operated on in 1929 and 1933, respectively, with an inadequate technique. Recurrences became manifest anywhere between seven months and eight years after the operation.—*Rechutes tardives de tuberculoses cavitaires unilatérales apparemment guéries par thoracoplasties, A. Bemon, H. Fruchand & M. Gautier, Presse méd., April, 1940, No. 33–34, 366.*—(*G. Simmons*)

Artificial Fibrosis.—The possibility of inducing pulmonary sclerosis with the use of different chemical substances was studied experimentally in dogs. Silver nitrate and torium bioxide are inadequate, because these substances are rapidly eliminated through the open bronchi. Various silicates mixed with collodion induce noteworthy sclerosis in the lungs of dogs. Best results, however, were obtained with a mixture of animal coal, cheratin (5:1) and collodion. This fluid mixture, introduced into the lung by means of a syringe, solidifies readily, adheres to the tissues and remains there, almost unchanged indefinitely. Around this substance a productive inflammatory process sets in, without secondary damage to lung tissue taking place. —*Sulla reazione del tessuto polmonare alla introduzione di sostanze estranee: Contributo sperimentale allo studio della chiusura artificiale di residui cavitari con bronco aperto nell'aspirazione endocavitaria, M. Mesiti & A. Baffoni, Ann. Ist. Carlo Forlanini, 1942, 6: 417.*—(*G. Simmons*)

Artificial Occlusion of Bronchi.—Lipiodol studies on cavities treated according to Monaldi's method of endocavitary aspiration revealed that in the majority of cases a residual cavity and open bronchi leading into the cavity persist after the treatment was discontinued, because clinically and radiologically the cavity had disappeared. The persistence of these residual cavities and bronchi is held responsible for the many failures to obtain permanent results with Monaldi's method. It was therefore thought to introduce a substance into the residual cavity which would be able to occlude permanently bronchus and residual cavity. Several substances (talcum, magnesium silicate etc.) were used unsuccessfully, but finally good results were obtained with a mixture of animal coal, cheratin and collodion. Numerous complications were encountered in the course of such a procedure: Sometimes there is a general reaction, which, however, is of short duration. The substance may be coughed up and bronchial irritation characterized by increased cough and mucous sputum may persist for some time. The substance may remain in the cavity and act like a foreign body, thus causing increased exudation and a filling-up of the cavity which had been believed closed following endocavitary aspiration. A reflow of the substance through the tract previously occupied by the catheter may occur, followed by pain, inflammation and formation of a fistula. Despite these facts, good results were obtained in several cases, but no definite statement as to the permanency of such cavity closures is at-

tempted at the present time, because the period of observation (six months to one year) and the number of cases are insufficient. In conclusion, it is believed that the theoretical approach to the problem, consisting in the necessity of occluding residual cavities and the distal part of bronchi leading into such a cavity with a substance which remains *in situ* permanently and causes a local sclerotic reaction, is correct, but that the substances used so far are not entirely satisfactory for this purpose.—*Tentativi di chiusura dei bronchi di drenaggio delle caverne applicati al metodo di aspirazione endocavitaria, V. Monaldi, Ann. Ist. Carlo Forlanini, 1942, 6: 403.*—(*G. Simmons*)

Artificial Occlusion of Bronchi.—Small residual cavities and the bronchus leading thereto were occluded successfully in 2 patients with a mixture of magnesium silicate and collodion, following Monaldi's intracavitary aspiration. No favorable results were obtained in other patients, because the substance, introduced by means of a catheter through the thoracic wall, was coughed up. A mixture of magnesium silicate and aluminum silicate (1:1) in collodion was subsequently used for the same purpose in 65 cases, and good results were obtained in about 50 per cent of the cases thus treated; 4 of them are described in the present paper. In the remaining cases different complications were encountered: filling-up of the cavity, which radiologically had appeared to be closed, with the substance introduced; activation of pericavitary nodular foci; secondary infection of the cavity; infection of the transthoracic tract which contained the catheter through which the intracavitary aspiration and introduction of the therapeutic mixture were practiced; pulmonary hemorrhages. None of the cases died, but the subsequent treatment, consisting in further intracavitary aspiration, was very long. In 60 other cases the closure of the residual cavity was attempted with the introduction of a mixture of animal coal, cheratin (5:1) in collodion. Although the occluding effect of this substance is inferior to that of the silicate mixture, the complications were fewer and a greater percentage of favorable results was obtained. Best results were obtained in cases in which there were no pericavitary tuberculous foci, the capacity of the residual cavity was not greater than 1 to 3 cc., the walls of the cavity were clean and when there was only a minimal amount of drainage.—*La chiusura artificiale delle vie bronchiali di drenaggio delle caverne nell'aspirazione endocavitaria.—Prime applicazioni cliniche, M. Mesiti & A. Baffoni, Ann. Ist. Carlo Forlanini, 1942, 6: 439.*—(*G. Simmons*)

The Cavity Complex.—The authors have reviewed 3,000 cases of pulmonary tuberculosis; 71.93 per cent presented clinical and X-ray evidence of cavitation. The three factors which contribute to the cavitary complex are the break in continuity of the parenchyma, that is, the cavity itself, the condition of the surrounding parenchyma and the condition of the communicating bronchus. The size of the cavity during life often does not correspond to the real size found at autopsy. This difference depends not only upon size and location of the cavity, but also upon elasticity, tension and movement of the surrounding parenchyma. The surrounding lung tissue may be apparently healthy. In this case, the cavity presents a punched-out picture. It may be exudative and form an early infiltration. In case of primary specific fibrosis or secondary nonspecific sclerosis of the parenchyma, the X-ray film shows dense shadows surrounding the cavity. Pneumothorax will not reduce the size of the cavity to a great extent. The cavities are rigid. Atelectasis or emphysema are consecutive to the condition of the bronchus. The communicating bronchial tract may be stenosed by scars, by ulcers or by vegetations. The stenosis from scars generally does not produce complete obliteration of the bronchus, whereas ulcerations create a diminution of the bronchial lumen and subsequently an obliteration of the valvular type. The valvular mechanism may permit

the free passage of air during inspiration only, creating an intraälveolar hypertension in the pulmonary tissue which appears distended. The more the passage of air is obstructed during expiration, the greater the emphysema. The cavity becomes distended and increases in size. The reverse mechanism results in atelectasis and a decrease of the size of the cavity. The authors emphasize the widest use of the bronchoscope. If in the absence of clinical and X-ray findings tubercle bacilli are present in the sputum, bronchoscopy is always indicated. Bronchial lesions respond only to local treatment. The indiscriminate institution of artificial pneumothorax in the case of bronchial tuberculosis is often detrimental.—*El complejo cavitario en la tuberculosis del pulmon, R. Bellesteros S. & J. Aedo Blasco, Rev. cubana de tuberc., October–December, 1944, 8: 559.—(W. Swienty)*

Intracavitary Pressures.—By photokymography the authors recorded simultaneous tracings of intracavitary pressures and the respiratory excursions of the thorax. According to the pressures found, cavities were classified as normo-, hypo-, hyper- and inert, pressure cavities.—*Las presiones intracavitarias en la fisiopatologiá de las cavernas y su registro gráfico, O. Vaccarezza & L. Berlin, An. Câted. de pat. y clin. tuberc., December, 1943, 5: 336.—(R. Kegel)*

Valvular Drainage of Insufflated Cavities.—A 19 year old male underwent a thoracoplasty with a view to collapsing a cavity of the right apex. Satisfactory results were not obtained. Later a cavernotomy was performed with the resultant cure of the patient. Aspiration alone of the cavities without thoracoplasty does not yield good results. It is advisable first to perform a thoracoplasty, followed by drainage of the cavity approximately twenty days later. Intermittent aspirations are performed in the days subsequent to the drainage. A second thoracoplasty is performed in order to achieve complete collapse. Seventeen cases have been thus treated by the author with 55 per cent of permanent cure, one operative death, one death caused by acute edema of the lungs, 4 deaths due to the progress of the disease, and 3 patients are alive but still positive for tubercle bacilli. Eloesser's technique is described. A modification of this technique, devised by the author, consists in the approximation and suturing of the cut-surfaces of the skin. Eloesser's operation alone should not give results, unless combined with thoracoplasty. —*Drenagem valvular das cavernas pulmonares insufladas (operacao de Eloesser), A. Amorim, Rev. brasil. de tuberc., September–October, 1944, 95: 259.—(P. B. Franca)*

Intracavitary Aspiration.—The following abstract is based on four different papers, which contain basically the same facts and the same material, but were published at different times in different journals. The papers used were:

1: Versuche über den Verschluss der Drainagebronchien bei Anwendung des Verfahrens der Kavernensaugdrainage, V. Monaldi, Ztschr. f. Tuberk., 1942, *89:* 105.
2: Der gegenwärtige Stand des Kavernensaugdrainageverfahrens in der Behandlung der tuberkuloesen Lungenkavernen, V. Monaldi, Ergebn. d. inn. Med. u. Kinderh., 1942, *62:* 68.
3: L'aspirazione endocavitaria nelle sue attuali direttive pratiche, V. Monaldi, Medicina e Biologia, 1942, *1:* 253.
4: Die Kavernensaugdrainage in ihren theoretischen Grundlagen und in ihren klinischen Indikationen (Beobachtungen an 700 Fällen), V. Monaldi, Deutsche med. Wchnschr., 1942, *11:* 673.

Extensive bibliography, up to and including 1941, may be found in the papers mentioned under (2) and (3). Monaldi's method of intracavitary aspiration in the treatment of certain forms of pulmonary tuberculosis has been generally accepted and the fear of operative complications has proved to be unfounded. During the first 100 intracavitary aspirations Monaldi had one fatal pulmonary embolus during the insertion of the trocar,

and another one during the reinsertion of a catheter which previously had been expelled without the cavity having been completely closed. Considering that the operation has been performed about 1,000 times and reinsertion of a catheter has been done not less than 2,000 times, the two above cited cases and another one of transient embolus from which the patient recovered represent a negligible percentage of operative complications. Hemorrhages during the operation are equally rare and if they do occur during the process of aspiration sometimes may be controlled by introduction of a thin rubber balloon, mounted on the catheter, into the cavity. The balloon may be inflated and thus local hemostasis may be produced. Infection of the catheter-bed occurs only rarely and can readily be controlled by discontinuing the aspiration temporarily. Instead of using one of the recently developed apparatus, the author prefers the old-fashioned system of two bottles partly filled with water to obtain the negative pressure desired and reserves the use of higher negative pressures, such as may be obtained with different apparatus, for the use on cavities with rigid walls and those in which it is difficult to establish a negative intracavitary pressure on account of widely patent bronchi. Too high and too prolonged suction is said to disturb the biological equilibrium, thus facilitating hemorrhages and exudative processes. By using the two-bottle system, the pressure varies continuously with the changes in the water level. The catheter can be introduced even in small-sized cavities with or without the aid of certain apparatus, such as those designed by Morelli or Dorn and Cadeddu. The author uses a trocar whose calibre corresponds to a No. 9 Nélaton catheter. It is admitted that cavities with initially and permanently occluded bronchi at the completion of the intracavitary aspiration are exceptions. As a rule, after the disappearance of the cavity following Monaldi's procedure, the bronchus leading into the "occluded" cavity remains open. To obtain a permanent closure of the communicating bronchus, experiments with the introduction of different tamponading and sclerotizing substances, injected into the residual cavity and the corresponding bronchus, have been carried on since 1941. It is generally admitted that immediate beneficial effects are obtainable with the Monaldi procedure, but the author maintains that permanent cures, too, may be obtained if the indications for this treatment are followed and if the treatment is carried out correctly. As causes for the reopening of cavities the following factors are considered: (*1*) The persistence of necrotic material in the cavity or the new formation of such material from small pericavitary foci which remained active. In this case the cavity walls touch each other, but permanent obliteration of the space does not occur. (*2*) Too early discontinuation of the treatment. In this case the walls touch each other but the time allowed for formation of scar tissue was not sufficient. (*3*) Persistence of a patent bronchus leading into the residual cavity. The author claims, on the basis of these considerations, that the majority of unsuccessful aspirations are due to faulty technique. The reduction of the volume of the cavity is only one factor in the process of healing, which in addition calls for: 1) cleaning of the cavity walls; 2) closure of the draining bronchus; 3) restitution of the anatomical and functional integrity of the pericavitary parenchyma; 4) stability of the newly formed scar tissues. Even though the cavity reopens, its further evolution is slowed down, the local and general condition of the patient is not compromised and the treatment can be resumed without difficulty. In conclusion and on the basis of his personal experience the author asserts that definite and permanent healing of cavities with the intracavitary aspiration may occur. As far as the indications for the Monaldi procedure are concerned, the problem of the origin of the cavity is considered. The method is contraindicated in the so-called "biological cavities" (fusion cavities) in which the loss of substance is great and the pericavitary tissue is diseased. But it is indicated in those cavities in whose formation mechanical factors, such as re-

traction of broken elastic fibres, were prevalent and which therefore are surrounded by atelectatic tissue. The author pleads for the abandonment of the conception of rigid cavities due to sclerotic phenomena and claims that the rigidity is only apparent and caused by the deposition of dense pathological material on the cavity walls. Once this material is eliminated, the walls become elastic again and may be subject to concentric retraction. Intracavitary aspiration therefore may be done even on very old cavities or those persistent after other collapse methods have failed. The method should not be used in partial or total fibrothoraces, however. Complete and persistent positive results were obtained also in cavities with a surrounding exudative process. Concomitant improvement of other homo- or contralateral lesions or concomitant diseases, such as diabetes, was observed, but not always. In brief here are the indications for the Monaldi procedure: (*1*) isolated cavities, surrounded by healthy lung tissue; (*2*) stationary cavities with inactive disease in the surrounding tissues; (*3*) pluricavitary lesions, as long as they fit into one of the above mentioned categories. In the presence of several cavities, the Monaldi procedure may be used in the following conditions: (*1*) isolated and separate bilateral cavities; (*2*) multiple cavities in the same lung, separate and distant from each other; (*3*) two cavities close together, of which at least one must be small and surrounded by considerable amount of healthy lung tissue; (*4*) communicating cavities. In the case listed under (*4*) the aspiration of one may close both cavities. In the case listed under (*3*) the same result may be obtained by applying suction to the superior cavity. In all other cases multiple aspirations are necessary. The author does not give any statistical material, but refers to "150 cases which had pulmonary tuberculosis for from three to fifteen years and which are cured or are near to being cured." Case histories and X-ray films of 31 patients with excellent results are reported. To obtain permanent closure of the draining bronchus after the completion of the intracavitary aspiration the author injects, after visualization of the residual cavity and the bronchus, a mixture of charcoal and cheratin (5:1), dissolved in collodion, into the residual cavity. The catheter is removed after an hour. This method was introduced in 1941 after experiments on dogs, sacrificed at intervals varying from a few hours to six months after such a treatment had proved that the substance injected becomes thick, adherent to the tissues and finally surrounded by fibrous tissue. Complications are encountered occasionally (coughing-up of substance injected, elimination through the catheter sinus, reopening of the cavity, exudative reaction etc.) but as a whole the results are considered to be very satisfactory, although, again, no statistical material is given. X-ray films of 5 cases in whom occlusion of the bronchus was artificially produced are reproduced in the paper listed under (*1*). The operative and postoperative technique is given in detail in the paper listed under (*2*).—(*G. Simmons*)

Pulmonary Hemorrhages during Intracavitary Aspiration.—Pulmonary hemorrhages, including streaking, occur not infrequently in the course of intracavitary aspiration. They were studied in 700 cases in which Monaldi's treatment was applied. In cases in which the bleeding was due exclusively to the therapeutic procedure, the following causes were most frequently found: (*1*) operative trauma and consequent injury to vessels of the lung or the thoracic wall; (*2*) too great negative pressure applied to the cavity; (*3*) temporary occlusion of the bronchus leading into the cavity due to the patient's position with consequently rising negative intracavitary pressure; (*4*) the catheter being in contact with the cavitary wall causes a local inflammation with new formation of vessels and their subsequent rupture. The treatment of these hemorrhages is subordinate to the cause and consists essentially in a temporary suspension of the intracavitary aspiration, the adjustment of the position of the tip of the catheter etc. In some cases,

however, in which the bleeding was particularly persistent local hemostasis with the introduction of a small rubber balloon into the cavity was successfully performed. The catheter was removed, the balloon was introduced into the cavity and inflated to the desired size. Thus local pressure was exerted on the interior surface of the cavity. No unfavorable reactions were encountered and the balloon was removed after five to ten days.—*Sul trattamento di alcuni fenomeni emorragici nel corso dell'aspirazione endocavitaria, M. Mesiti & S. Chiodi, Ann. Ist. Carlo Forlanini, 1942, 6: 515.*—(*G. Simmons*)

Reopening of Cavities after Intracavitary Aspiration.—Since the reopening of cavities after the completion of intracavitary aspiration and the radiological disappearance of the cavity is a common experience, apparently closed cavities were filled with lipiodol and the draining bronchus could be invariably demonstrated. It is clear, therefore, that the resistance offered by the bronchi is much greater than that of the cavity in itself. It is believed that the negative pressure used during the intracavitary aspiration is not sufficient to cause collapse of the bronchial walls. Furthermore, during those periods of intracavitary aspiration during which suction is not applied (at night, at mealtime etc.) the artificially created negative pressure in the cavity causes an influx of air through the partially collapsed bronchus and restitution of the original size of the cavity. Since attempts of occluding the bronchus leading into the cavity by means of introduction of blood, electrocoagulation etc. were not successful, it is suggested to obtain a permanent collapse of the bronchus leading into the cavity by means of a permanent very highly negative pressure. The negative pressures used were as high as 60 to 90 Hg/mm. No details about the length of such a treatment and the results obtained are given.—*Die Wiedereröffnung saugdrainierter Kavernen und ihre Vermeidung, L. Kiss, Ztschr. f. Tuberk., 1942, 89: 11.*—(*G. Simmons*)

Pneumonectomy for Primary Tuberculous Pneumonia.—A 5½ year old boy was referred to surgery with the diagnosis of gangrene of the right lung. During the operation large areas of caseation were found in the lung. The diagnosis of "primary caseous necrotic gangrenous tuberculous lobitis" was established and later proved by bacteriological studies. A great part of the lung was removed. The patient was cured and has remained so for nearly six years.—*Lobite tuberculosa primaria caseo-necroptica gangrenada, pulmonectomia a cauterio cura, A. Amorim, Rev. brasil. de tuberc., July–August, 1944, 94: 197.*—(*P. B. Franca*)

Technique of Lobectomy.—Barata states that his experience has shown him that the site of the incision for the extirpation of the different lobes must not only follow anatomical reasons but depends also on the nature of the underlying pathological process. Lobectomies for cancer in which there are no or few adhesions should be guided by anatomical reasons, the pulmonary or lobar pedicle determining the incision. In case of pulmonary suppuration with frequent adhesions, the incision should be made where the adhesions can most easily be freed. Always, the lobe has to be freed first. After that the pulmonary vein or its ramifications are ligated and cut. Next comes the artery and last the bronchus. There is no more bleeding from adhesions when they are freed before or after the vessels have been tied. For the left upper lobectomy the antero-median two-thirds of the fifth rib are resected and the fourth rib cut near the postero-lateral extremity of the incision. The possibility of a special vein for the lingula has to be kept in mind. After dividing, the bronchus is closed after Rienhoff. The bronchial stump is covered with pleura or a portion of the parenchyma. For the inferior left lobectomy, the sixth rib is resected, either totally or in its posterior two-thirds; for the superior right lobectomy, the fourth rib in its anterior two-thirds; for the right middle lobectomy, the

anterior two-thirds of the fifth rib; and for the inferior right lobectomy, the sixth rib entirely or its posterior two-thirds. In this case the author uses the lateral portion of the middle lobe to cover the bronchial stump. Before closure of the thorax the remaining lobes are inflated by the anesthetist. Failure to distend fully and freely is considered as proof of injury. The noninflated segments should be resected at once.—*Tecnica de las lobectomias pulmonaras, R. Barata R., Rev. cubana de tuberc., October-December, 1944, 8: 637.—(W. Swienty)*

Rapid Growth of Mycobacteria.—Rapid and submerged growth was produced by five strains of saprophytic mycobacteria, five virulent avian strains, one bovine strain (Ravenel) and two human strains (H37RV and Jamaica No. 22) on Long's medium to which was added (*a*) phosphatide fractions prepared from egg yolk, cattle brain, human erythrocytes and soya bean, (*b*) synthetic non-ionic surface active agents consisting of esters of long chain fatty acids and of polyhydric alcohols. Addition of 0.1 cc. of culture to 10 cc. of new medium was sufficient to secure growth of the saprophytic and avian strains within twenty-four hours and of the bovine and human strains within seventy-two hours. Addition of purified serum albumin (0.1 per cent or less) further enhanced the growth. The cultures so obtained were typical in morphology and staining characteristics and grew slowly again and on the surface when returned to Long's medium.—*Rapid and Submerged Growth of Mycobacteria in Liquid Media, R. J. Dubos, Proc. Soc. Exper. Biol. & Med., April, 1945, 58: 361.—(F. B. Seibert)*

Hamster versus Guinea Pig for Tuberculosis Diagnosis.—To find a test animal for the presence of tubercle bacilli which would be more economical than the guinea pig would be of definite value. It has been suggested that the hamster, a small Asiatic rodent, might replace the guinea pig for biological tuberculosis tests because of its low cost and maintenance, its smallness (economy of space), short gestation period (sixteen days with litters of 6 to 10), and its susceptibility to inoculation tuberculosis. The earliest report on the use of hamsters in the diagnosis of tuberculosis appears to be that by Korns and Lu from Peking Union Medical College in 1927. They found them cheap and quite sensitive to injection tuberculosis, although the lesions were smaller than in the guinea pig and there was less caseation. On the other hand, tubercle bacilli are usually found in abundance in the lesions, an advantage over the guinea pig where they are sometimes difficult to find. These authors made no comparison of the hamster's susceptibility to tuberculosis with that of the guinea pig, so doses were not standardized. Nevertheless, they concluded that the hamster was a practical substitute for the guinea pig. Two other investigators also reported that the hamster was suitable for the diagnosis of tuberculosis, but rather large doses of organisms were used in their experiments. Since all available data contain no accurate information as to the actual susceptibility of the hamster as compared with the guinea pig, the present authors decided to determine this by quantitative experiments. There seem to be two hamsters extant, namely the Syrian or golden hamster and the striped hamster. These resemble each other very closely. The former was used. Three human and two bovine strains of virulent tubercle bacilli were employed. Hamsters and guinea pigs in turn were injected subcutaneously each with 1.0 mg. or 0.001 or 0.000,001 mg. of the different strains of bacilli. The guinea pigs were found to be definitely more susceptible to tuberculosis than the hamsters for all showed involvement, even after the smallest dose, whereas it nearly always took the largest dose to produce any involvement in the hamsters. One of the bovine strains however, a eugonic strain (the other was dysgonic), did produce some tuberculosis with the smallest dose in the hamsters, but

the involvement was not quite as great as in the guinea pigs. It is evident that the guinea pig, relatively speaking, is far more susceptible to virulent human tubercle bacilli injected subcutaneously than is the hamster. For this reason the guinea pig is the animal of choice for the clinical diagnosis of tuberculosis. The superiority of the guinea pig over the hamster in this wise is not as great when bovine tuberculosis is being considered. The article ends with a plea for the use of cultural methods for detecting bacilli instead of by injection although no definite data are presented illustrating the advantages of the former. (Illustrated.)—*The Biological Diagnosis of Tuberculosis: Quantitative Animal Evaluation Tests on the Syrian Hamster and the Guinea Pig, H. J. Corper & M. L. Cohn, Am. J. Clin. Path., November, 1944,* ***14:*** *571.—(J. S. Woolley)*

Gastric Examinations.—The author emphasizes the importance of the examination of gastric washings for the etiological diagnosis of pulmonary tuberculosis. He refers to the difficulties of obtaining sputum in children and adults who do not expectorate. He mentions the fact that in some countries the material obtained from the bronchial tree by bronchoscopy is examined instead of the gastric washings. The question whether the bacilli found in the gastric washings are of pulmonary origin and whether they originate from active lesions is discussed. The author states that in the great majority of cases the bacilli found in the gastric washings are of pulmonary origin and come from active lesions. The concepts of "open and closed" pulmonary tuberculosis, "normal carriers" of tuberculous bacilli are to-day considered obsolete. Under the medico-social point of view the examination of the gastric washings is as important as roentgenological examination. The author describes in detail the technique he uses for the examination of the gastric washings. This includes the culture in Loewenstein asparagine medium and guinea pig inoculation.—*O lavado gastrico e sua importancia medico-social, H. E. Jouval, Rev. brasil de tuberc., May–June, 1944,* ***93:*** *155.—(P. B. Franca)*

Diagnostic Pulmonary Lavage.—The search for tubercle bacilli in the bronchial lavage was tried in tuberculous patients who could not raise sputum. After applying local anesthesia to the pharynx and trachea, 20 to 40 cc. of saline solution were instilled in the bronchial tree, and the material thus coughed out was collected. Nineteen positive cases, by smear, culture, or guinea pig inoculation, were found in 80 completely investigated cases. These patients either produced no sputum, or the sputum examination had been negative. A comparative study between the results of the examination of the pulmonary lavage and the gastric lavage was made in 12 patients, both tests being made the same day. Whereas no positive case was found in gastric lavage examinations, tubercle bacilli were found in 5 cases in pulmonary lavage examinations.—*Primeiros resultados do lavado pulmonar no diagnostico bacteriologico da tuberculose, M. Abreu, Ap. respir. y tuberc. (Chile), January–March, 1945,* ***10:*** *5.—(H. Behm)*

Diagnostic Pulmonary Lavage.—The intercrico-thyroid puncture for pulmonary lavage has been abandoned. The author devised a new transglottic method. The uvula, pharynx, larynx and trachea are anesthetized with 0.5 per cent novotutocaine solution; 20 to 40 cc. of physiological saline solution are then introduced during inspiration. Cough is provoked and the secretion is collected for examination. To reach all parts of the lung the patient is instructed to move his chest in all directions. This method of pulmonary lavage has been used in all cases of suspected pulmonary tuberculosis without cough or expectoration and in which sputum and gastric contents are negative for tubercle bacilli. One hundred and seventy lavages were done. The method is well tolerated, even in patients with hypertension. No case of dissemination of the disease has been observed. This is due to the fact that hematogenous and bronchogenic spreads depend

upon the same immunological and biological factors which are responsible for clinical progression. In 3 cases with chronic bronchitis slight elevation of temperature for one day was observed. In 80 lavages enough material was obtained for culture and animal inoculation. Of these, 19 were found to be positive. In all 19, previous sputum and gastric examinations had always been negative. Direct microscopic examination of the specimen was positive in only 3 cases, whereas the culture was positive in 12 and animal inoculation in the remaining 4. Lately the author has not used more than 10 cc. of saline solution. Sometimes even the 4 cc. of novotutocaine are enough to produce sufficient secretion. An average of 10 lavages a day are now done in the two main hospitals of Rio de Janeiro, Brazil.—*El lavado pulmonar en el diagnostico bacteriologico de la tuberculosis, M. D. Abreu, Prensa méd. argent., March 9, 1945, 32: 405.*—(*W. Swienty*)

Detection of Tubercle Bacilli in Urine.—The author examined 443 twenty-four-hour urine specimens which were preserved by addition of 1.5 ml. one per cent acriflavine (3,6 diamino, 10 methyl acridine chloride) and 40 ml. McIlvaine's buffer solution pH 4.0. The urine was precipitated by addition of 5 ml. 5 per cent tannic acid, refrigerated overnight and then centrifuged. The precipitate was digested at 37°C. for twenty to thirty minutes with 3 per cent sodium hydroxide, washed with physiological saline. Smears were made and Petragnani's medium inoculated and incubated at 37°C. Colonies of *M. tuberculosis* appear after two weeks and within four weeks. Acid-fast bacilli were found in 10.8 per cent of the smears while 16.6 per cent of the cultures were positive for *M. tuberculosis;* however, 6 of the positive cultures originated with concentrates found negative by smear. The author reports that the collection of urine in the acriflavine-buffer solution inhibits the growth of other bacteria frequently present in specimens from cases of renal tuberculosis. The concentration of acriflavine used exerts no effect on *M. tuberculosis.*—*Routine Examination of Urine for Mycobacterium Tuberculosis, H. J. Peppler & J. T. Hill, Brit. J. Exper. Path., December, 1944, 25: 193.*—(*H. J. Henderson*)

Tubercle Bacilli in Pleural Fluid.—Great divergence exists in the literature as to the frequency of tubercle bacilli in pleural fluids (Frederiksen, 1934, 5 per cent; Naito, 1938, 82 per cent). Using different culture media the pleural fluid of 63 patients with primary pleurisy with effusion was examined and positive bacteriological results were obtained in 58, 33 per cent. Noteworthy is the fact that the fluid of several patients in whom the effusion was obviously due to tuberculosis and who died of this disease shortly afterwards was negative for tubercle bacilli.—*Presenza del bacillo di Koch nell'essudato delle pleuriti siero-fibrinose cosidette primitive, G. Daddi & G. Spina, Ann. Ist. Carlo Forlanini, 1942, 6: 196.*—(*G. Simmons*)

Tubercle Bacilli in Milk.—Tuberculin tests were made on 322 cows in Buenos Aires. These tests showed a percentage of tuberculous infection as high as 30.7 per cent. Tubercle bacilli were investigated through smears and guinea pig inoculations in 94 samples taken from the allergic cows showing no symptoms of tuberculous mastitis. No tubercle bacilli were found in any of the samples. This investigation, nevertheless, cannot be considered as final, in view of the fact that the bacteriological research was not complete, and only one guinea pig inoculation was made in each case. The negative results seem to be particularly influenced by the absence of tuberculous mastitis. Special emphasis was placed on the danger of such wide-spread tuberculous infection among cows, which brings forth the possibility that at any moment a tuberculous mastitis could break out, thus contaminating the milk.—*Investigación del bacilo de Koch en la lecha de vacas tuberculino-positivas, A. R. Arena & R. Cucchiani, An. Cáted. de pat. y clin. tuberc., June, 1944, 5: 68.*—(*H. Behm*)

Rapid Staining of Acid-fast Bacilli.—Rapid routine staining of acid-fast organisms with

carbolfuchsin usually employs heat to produce more rapid penetration of the stain. Recently Tergitol No. 7, a detergent or wetting agent, was used as a substitute for heat and found that staining occurs more rapidly than with heat. One drop of Tergitol is added to 30 to 40 cc. of Kinyoun's carbolfuchsin prior to use. Smears are stained for one minute and sections of tissue for five minutes followed by decolorization with acid alcohol and counterstaining as usual. The shorter time required for staining and the ease with which the procedure can be employed constitute improvements in technique which make the methods particularly applicable to routine use. Equal or better results are obtained with these procedures than with the older methods, and none of the required specificity for acid-fast organisms is lost.—*A Rapid Staining Technique for Acid-fast Organisms, H. E. Mueller & R. L. Chermock, J. Lab. & Clin. Med., February, 1945, 30: 169.—(F. G. Petrik)*

Demonstration of Tubercle Bacilli in Sputum.—A comparative study was made of four methods used to prepare sputa for the identification of tubercle bacilli. The methods chosen were (*1*) direct smear, (*2*) autoclave (heat coagulation) and concentration, (*3*) sodium hydroxide digestion and concentration, and (*4*) clorox digestion and concentration. The results show that the clorox digestion method is the most efficient. With it, the greatest percentage of positive specimens was obtained and there was a greater concentration of organisms per microscopic field. Because of this greater concentration fewer fields had to be examined to find acid-fast bacilli.—*Comparison of Methods Adaptable to Production Line Examination of Sputum for Tubercle Bacilli, G. M. Cameron & R. Castles, J. Lab. & Clin. Med., February, 1945, 30: 163.—(F. G. Petrik)*

Alveolar Cells of Lung.—The nature of the cells lining the air sacs, the subject of many investigations in the past (Villemin, Zenker, Kölliker, Addison), has been revived in recent years by investigators who used modern histo-physiological methods. Opinion is divided between those who state that the pulmonary alveoli are lined by a continuous layer of epithelial (ectodermal) cells and those who found that the walls of the alveoli are virtually "nude" and that cells found scattered along the septa are mesodermal. Porto's study is concerned with the structure of the lower respiratory portion of the lung, particularly with the cells lining the walls of the air vesicles. The experiments were conducted on dogs, cats, rabbits and rats who received trypan blue via the trachea. Experimental procedures as well as methods used in the study of the material are given in some detail. The conclusion was reached that morphologically, by their disposition and functions, the cells of the septa are of mesodermal origin and that they are a part of the macrophage (reticulo-endothelial) system of Metchnikoff. Porto failed to find so-called anucleated plates along the septa, but he disclosed the presence of interalveolar communications (pores of Kohn) which, in his view, is another evidence against the epithelial nature of the cells "lining" the pulmonary septa.—*The Nature of the Alveolar Cells of the Lungs, J. Porto, Publicaciones del centro de investigationes tisiologicas, Buenos Aires, vol. 7, p. 349.—(B. M. Fried)*

Erythrocyte Sedimentation Rate.—The only safe and sound solution of the problem of "correction" of values for the sedimentation rate is to discard all correction charts and to evaluate the observed sedimentation rate by comparison with the clinical picture, since one knows from a large body of statistics how the sedimentation rate is usually affected in different diseases. Recording of degrees of sedimentation at frequent intervals is only time-consuming and gives no more information than a reading at the end of one hour. Determinations of the sedimentation rate need no longer be omitted if venipuncture is not practicable, since a pipet can be made which is suitable for both venous and capillary blood. A long pipet is far preferable to a short

one. Normal and pathological values of the sedimentation rate are practically the same whether obtained with the Westergren pipet, which is 2.5 mm. in diameter, or with a long pipet 1.2 mm. in diameter which permits the use of either venous or capillary blood. Thus one may profit from statistics compiled from millions of readings made with the Westergren pipet. (Author's Summary.)—*Determination of Sedimentation Rate of Red Blood Cells: Use of So-Called Correction Charts and Optimum Length and Diameter of the Pipet, J. T. Peters, Arch. Int. Med., February, 1945, 75: 105.*—(*G. C. Leiner*)

Endobronchial Tuberculosis.—Endobronchial tuberculosis complicates the treatment of pulmonary tuberculosis and increases the gravity of the prognosis. It may occur at any stage of parenchymal disease. There is a fairly high incidence in minimal cases. Failure to apply present knowledge results in a high incidence of complications in collapse procedures applied to patients with tuberculous bronchitis. These are then considered therapeutic failures with persistent positive sputum, uncontrolled symptoms, empyema, unexpandable lung, atelectasis and anaerobic infection. Endobronchial tuberculosis has been found in 10 to 15 per cent of patients at the time of sanatorium admission. An incidence of 30 to 60 per cent is reached in those with symptoms or signs. There is a preponderance of females, 75 to 85 per cent in the literature, and 72 per cent in the series reported by Wilson. Twelve per cent of the children admitted to Maybury Sanatorium present the clinical picture of "epituberculosis" at some time or other; 75 per cent of these give bronchoscopic evidence of endobronchial tuberculosis or bronchial occlusion due to involvement of lymph nodes. Forty per cent of tuberculosis autopsies reveal endobronchial tuberculosis. The earliest lesion seen bronchoscopically as well as pathologically is submucosal, representing an extension to the main bronchus from a bronchial division. The posterior half of the bronchus is more frequently involved than is the anterior half. Later, hyperplastic changes with ulceration are seen. Healing by fibrosis may occur at any stage and may produce stenosis. Stenosis is most likely to occur in areas involved by extensive ulceration or by hyperplastic changes. In 36 consecutive cases of stenosis there were 20, or 55.5 per cent, involving the left main bronchus and 11, or 35.5 per cent, involving the orifice of the right upper lobe. The explanation for this predilection is unknown but may be concerned with lymphatic drainage in the bronchial wall. Clinical indications for bronchoscopy consist in unilateral wheeze, positive sputum without evidence of parenchymal source, severe symptoms without evident parenchymal source, intermittent retention of secretions or prolonged fever following thoracoplasty are indications for bronchoscopy. Roentgenologically, mediastinal shift with or without elevation of the diaphragm, "hilar flare," opaque lesions appearing suddenly following institution of collapse therapy, basal tuberculosis, certain types of cavity (thin-walled, those containing fluid levels, those that fluctuate in size), wide-spread parenchymal disease without evident parenchymal source, and obstructive emphysema are indications for bronchoscopy. The following contraindications to bronchoscopy are listed: terminal tuberculosis, pulmonary hemorrhage, acute respiratory infection and acute tuberculous laryngitis. Bronchoscopic technique is stressed as of the utmost importance. Three grains sodium pentobarbital and ¼ grain morphine are given in preparation together with local anesthesia consisting of 10 per cent cocaine hydrochloride to the posterior pharynx and 2 per cent to the trachea and bronchi. The bronchoscope should be passed slowly and kept proximal to the lesions. Granulation tissue or ulcerated areas should receive applications of 30 per cent silver nitrate. The bronchoscope should be withdrawn slowly with aspiration of secretions accumulating around the tube. After bronchosopy, to avoid spread, the patient should lie on the affected side for three hours since the cough reflex has been abolished.

Results obtained by therapy depend on (*1*) the type of endobronchial lesion, the submucosal lesion having better prognosis than have the others, (*2*) the interval between treatments (a two to three week interval should be maximal or granulation tissue grows up causing stagnation of secretions and increased inflammatory reactions), (*3*) the general therapy being administered, (*4*) the duration of bronchial disease, and (*5*) the control obtained of parenchymal lesions. The author advises that no attempt be made to dilate fibrotic stenosis. Instead he suggests thoracoplasty or pneumonectomy. He advises against biopsy because of the possibility of initiating ulceration. He advises treatment with silver nitrate every two weeks until healing ensues, following which intervals between applications should be gradually lengthened. If no response is obtained over a reasonable time pulmonary resection is advised.—*Bronchoscopic Observations in Tuberculous Tracheobronchitis—Clinical and Pathological Correlations, N. J. Wilson, Dis. of Chest, January–February, 1945,* ***11:*** *36.* —(*K. R. Boucot*)

Tuberculous Bronchopathy.—A case of residual tuberculous bronchiectasis is described. The etiological factors for residual tuberculous bronchiectasis are: constitutional debility of the wall of the bronchus, altered tension caused by the infection and the retention of the secretion, peribronchitis, tuberculous lesion of the bronchial wall, artificial collapse and pleural effusion which during reabsorption causes a lowering of the intrathoracic pressure. In a second case, a bronchial obstruction was found in a woman of 33 years of age who had had asthma since she was two years old which disappeared after puberty and reappeared with her first pregnancy. She had been exposed during her infancy to direct tuberculous contact. It is thought that the reappearance of the asthma during pregnancy is due to the reactivation of the childhood lesions. At this time the clinical symptoms of bronchial obstruction started. The pathogenesis is explained as follows: pregnancy and childbearing as anergic causes; exogenous reinfection; aspiration; lysis and absorption of the bacilli by the lymphatics; endogenous reinfection and softening of the tubercle. Bronchoscopy was negative for tuberculous lesions but the sputum was highly positive. Repeated X-ray studies gave the picture of a slowly progressing atelectasis of the left lower lobe. A lipiodol study showed almost complete obstruction of the secondary and tertiary bronchi. This case is considered as a proliferative tuberculous bronchitis with localization in the finer bronchi of the left inferior lobe. Incidentally, it was found that the patient had narrowed bronchi of the right lower lobe, probably as a sequela of congenital syphilis which may have been the predisposing cause for the subsequent tuberculous localization.—*Broncopatias cronicas tuberculosas, H. G. Machado & A. C. Mendez, Rev. cubana de tuberc., July–September, 1944,* ***8:*** *486.*—(*W. Swienty*)